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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,046	03/22/2004	Kurt M. Strack	KJT-04-01	9993
34010	7590	04/07/2005	EXAMINER	
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			ART UNIT	PAPER NUMBER
			2862	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/806,046	Applicant(s) STRACK ET AL. 	
	Examiner Reena Aurora	Art Unit 2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 37 is/are pending in the application.
- 4a) Of the above claim(s) 20 - 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 8 is/are rejected.
- 7) ☒ Claim(s) 9 - 19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/28/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of invention I defined in claims 1 - 19 in the reply filed on 01/18/05 is acknowledged.
2. Claims 20 – 37 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 01/18/05.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, a first switch operatively coupled between the plurality of voltage measurement electrodes, the current source electrode and the digital voltage measuring circuit and a second switch operatively coupled between the plurality of voltage measurements electrodes, the current source electrode and a source of measuring current as claimed in claim 16 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure

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number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claim 15 is objected to because of the following informalities: Applicant is suggested to delete the word "at" at line 5. Applicant is also suggested to add the phrase "--proximate the earth's surface--" at line 6 before the phrase "at the selected lateral distance from the pipe" to clarify the claim language. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamarchenko (5,809,458) in view of Gissler et al. (5,680,049).

7. As to claim 1, Tamarchenko discloses a method and apparatus for determining electrical resistivity of earth formations through a conductive pipe (4, fig. 1) in a wellbore (2) including a sonde (26) adapted to be moved through the wellbore (2); a plurality of voltage measurement electrodes (18, 20, 22) disposed on the sonde (26) at spaced apart locations, at least one current source electrode (16) disposed on the sonde (26) and a digital voltage measuring circuit (28) controllably coupled to selected ones of the voltage measurement electrodes (18, 20, 22) (col. 3, lines 49 - 60).

Tamarchenko does not explicitly disclose the current source electrode (16) and the voltage measurement electrodes (18, 20, 22) adapted to make contact with the pipe (4).

Gissler et al. (hereinafter Gissler) discloses an apparatus for measuring formation resistivity through a conductive casing wherein all electrodes (208, fig. 1) are adapted to make contact with the pipe (202) (col. 4, lines 40 - 52).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to modify the device of Tamarchenko in view of the teachings of Gissler to provide means to the current source electrode and the voltage measurement electrodes such that the electrodes can selectively be extended to make electrical contact with the pipe and the electrodes can be retracted when the sonde is moving through the wellbore without damaging the casing or the electrodes themselves.

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8. As to claim 2, Tamarchenko fails to show that the digital voltage measuring circuit comprises of at least a twenty four bit resolution analog to digital converter.

Gissler discloses an apparatus for measuring formation resistivity through a conductive casing wherein the voltage measuring circuits (226, 228, 230A, fig. 6A) include an analog to digital converter (not shown, col. 14, lines 47 - 54). Gissler further discloses that analog to digital converter transmits the signals to the earth's surface in digital form for further processing and should not be construed as a limitation on the invention (col. 14, lines 51 - 54). Gissler does not explicitly disclose having a twenty four bit resolution analog to digital converter. Since Gissler disclose having an analog to digital converter in his device. It would be within the level of one skilled in the art to include in Gissler's device an analog to digital converter comprising of at least a twenty four bit resolution to convert the signals into digital form very precisely, increasing the resolution of the analog to digital converter will increase in the accuracy of the signals produced by the analog to digital converter.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to modify the device of Tamarchenko in view of the teachings of Gissler to provide for an analog to digital converter of twenty four bit resolution in the digital voltage measuring circuit such that the measurements are transmitted to the earth's surface in digital form very accurately for further processing.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamarchenko (5,809,458) in view of Gissler et al. (5,680,049) as applied to claim 1 above, and further in view of Singer et al. (5,543,715).

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10. As to claim 4, Tamarchenko and Gissler both fail to show digitally synthesized current source coupled to the at least one current source electrode. Singer et al. (hereinafter Singer) discloses method and apparatus for measuring formation resistivity through casing wherein digitally synthesized current source (38, fig. 7 and 38 B, fig. 10A) is coupled to the at least one current source electrode (16 B) (col. 12, lines 8 – 28 and col. 14, lines 60 - 63).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to modify the device of Tamarchenko and Gissler further in view of the teachings of Singer to couple the digitally synthesized current source to at least one current source electrode to improve the efficiency of rejecting out of phase components of the measurement (col. 12, lines 21 - 24).

11. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamarchenko (5,809,458) in view of Gissler et al. (5,680,049) and Singer et al. (5,543,715) as applied to claim 4 above, and further in view of Gard et al. (4,837,518).

12. As to claim 5, Tamarchenko, Gissler and Singer fail to show the current source is adapted to generate switched direct current.

Gard et al. (hereinafter Gard) discloses method and apparatus for measuring resistivity of a geological formation through casing wherein the current source is adapted to generate switched direct current (col. 2, lines 7 – 13 and col. 8, lines 46 - 57).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to modify the device of Tamarchenko, Gissler and Singer further in

view of Gard to adapt the current source to be able to generate switched direct current to avoid errors due to movement of the measurement device through casing and so called skin effects along the casing wall which are noticeable with relatively high frequency current and the switched DC source minimizes the error signals from the system (col. 2, lines 58 - 60).

13. As to claim 6, Tamarchenko, Gissler and Singer fail to show the current source is adapted to generate switched direct current having less than a one hundred percent duty cycle.

Gard discloses that the current source is adapted to generate switched direct current having less than a one hundred percent duty cycle (col. 7, lines 63 – 66, col. 2, lines 7 – 13 and col. 8, lines 46 - 57).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to modify the device of Tamarchenko, Gissler and Singer further in view of Gard to adapt the current source to be able to generate switched direct current having less than a one hundred percent duty cycle such that the current source will generate a square wave signal so alternating portion of the signal can be effectively removed.

14. As to claim 7, Tamarchenko discloses the current source (32, fig. 1) is adapted to generate alternating current having a selected frequency and waveform (col. 3, lines 54 - 58).

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15. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamarchenko (5,809,458) in view of Gissler et al. (5,680,049) and Singer et al. (5,543,715) as applied to claim 4 above, and further in view of Strack (6,541,975).

16. As to claim 8, Tamarchenko, Gissler and Singer fail to disclose the current source generating a pseudo random binary sequence. Strack discloses a system for generating an image of an earth formation where Strack teaches that when the current source is excited by time domain excitation then the signal may be a square wave, or a pulsed, triangular or a pseudo random binary sequence signal which prevents strong coupling between the transmitter and the receiver (col. 1, lines 38 – 46 and col. 1, line 65 – col. 2, line 5). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to modify the device of Tamarchenko, Gissler and Singer further in view of Strack to adapt the current source to be able to generate pseudo random binary sequence such that the device produces sensitive data to distant information resistivity than frequency domain or DC data (col. 2, lines 19 - 21).

Allowable Subject Matter

17. Claims 3 and 9 – 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. As to claim 3, the prior art fails to show that the ADC has a sampling rate of at least one thousand times a frequency of electrical current used to energize the at least

one current source electrode. This feature taken together with the other limitations of the claims renders the claims allowable over prior art.

19. As to claim 9, the prior art fails to show at least one focusing current source controllable to maintain a selected voltage drop across a pair of reference potential electrodes and the focusing current source is electrically coupled to selected electrodes on the sonde. These features taken together with the other limitations of the claim renders the claim allowable over prior art.

20. As to claim 10, the prior art fails to show the digital measuring circuit being adapted to determine a direct current bias extant on the voltage measurement electrodes by operating continuously. This feature taken together with the other limitations of the claims renders the claims allowable over prior art.

21. As to claims 11 – 14, the prior art fails to show at last one focusing current source controllable to maintain a selected voltage drop across a pair of reference potential electrodes, the focusing current source electrically coupled to selected electrodes on the sonde and a switch to selectively connect selected ones of the electrodes to the focusing current source and to digital voltage measurement circuit. These features taken together with the other limitations of the claim renders the claims allowable over prior art.

22. As to claim 15, the prior art fails to show a switch to select a return path for measuring current from the current source electrode to the selected one of the electrode coupled to the top of the pipe and the electrode disposed proximate the earth's surface

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at the selected lateral distance from the pipe. This feature taken together with the other limitations of the claim renders the claim allowable over prior art.

23. As to claims 16 – 19, the prior art fails to show a first switch operatively coupled between the plurality of voltage measurement electrodes, the current source electrode and the digital voltage measuring circuit and a second switch operatively coupled between the plurality of voltage measurements electrodes, the current source electrode and a source of measuring current to make measurements of voltage drop representing at least one of selected lateral depths of investigation and selected axial resolution. These features taken together with the other limitations of the claim renders the claims allowable over prior art.

Prior Art of Record

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Koelman (5,608,323) is cited for its disclosure of an arrangement of the electrodes for an electrical logging system for determining the electrical resistivity of a subsurface formation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reena Aurora whose telephone number is 571-272-2263. The examiner can normally be reached on Monday - Friday, 7:00 - 3:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, E. Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Reena Aurora